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TABLE OF CONTENTS.

THE TWIG GIRDLER.*

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Oncideres cingulatus (Say), **Order Coleoptera; family Cerambycidæ.**

"A thick-bodied longicorn, dark gray beetle about .5 inch long, with its wing-covers sprinkled over with faint tawny yellow dots."

In making a study of the galls of this community during the fall of 1907, I came across the work of the "Twig Girdlers." These singular beetles appear in Ohio from the middle of August until the middle of September. Figure 1 represents the beetle and the incision it makes. According to Slingerland, this beetle always works head downward. This would discredit the drawing by Riley. Prof. Glenn W. Herrick says, in his paper on "The Pecan Pruner" (O. texana Horn.) that the beetle works head downward.

Professor Haldeman states that "both sexes are rather rare, particularly the male, which is rather smaller than the female, but with longer antennae." The female does all the work. She makes perforations (Fig. 1, b) in the branches in which she deposits her eggs (one of which is represented of the natural size at Fig. 1, e.) She then proceeds to gnaw a groove, of about a tenth of an inch wide and deep, around the branch and below the place where the eggs are deposited so the exterior portion dies and the larva feeds upon the dead wood.

Mr. James Brodie describes the manner of cutting of the **O. texana** as follows:

"In starting work, a patch the desired width of cut is cleaned and the bark eaten. Then the powerful mandibles are brought to work on the wood. A cut is first made at the top, then the head moves down to

* Contribution from Biological Laboratory, Ohio University.

the bottom, where a corresponding cut is made; then working from the bottom cut, the wood fiber is raised and as the piece was cut free to start with at the top, it is already detached when the piece is torn loose to the top cut. Then another cut is made at the top; then at the bottom, and so on till the insect reaches in as far as it can conveniently. It then moves to either side of this cut, eats off another strip of bark and goes to work on the wood as before."

In this study my observations are confined to the following trees: Elm, Hickory, Linden, Honey Locust and Persimmon.

Manner of Girdling: The Elm branches were girdled as shown in Figure 2. The diameter of the girdled branches varies from one-fourth to one-half inch, and the depth of the grooves varies from one-tenth to one-eighth inch. These measurements hold good for the Hickory, the Persimmon, and the Honey Locust also. In all instances observed on the elm the branches were completely girdled and all in the same manner. Attacks on this tree were not numerous.

Figure 3 shows the manner of girdling the Hickory. The grooves were cut in the same way as on the Elm tree branches. Attacks on this tree were a little more numerous than on the Elm. Eight months after they were girdled these branches (Fig. 3) had not broken off the tree. I found a few branches in their natural position on the tree twenty months after they had been girdled.

The Linden suffered more than either of the above trees. Figure 4 shows that these branches are not girdled, they are cut off. For a short time in the fall they can be seen hanging by the small thread of bark which is left (Fig. 5). They soon break off and fall to the ground, almost with the first wind. On a small tree about twenty-five feet high I counted twenty-four branches cut off as shown in Figure 5. In every instance observed the Linden branches were cut off and not girdled.

The Honey Locust was gridled in the same manner as the Elm and the Hickory, and suffered more than all the other trees combined. On one field trip the girdled branches on the first twenty Honey Locust trees were counted. The trees were taken as they were found. No sorting was done. The result of the count is given below:

Number of Tree.	Number of branches girdled.	Number of Tree.	Number of Branches girdled.
1	18	11	18
2	5	12	24
3	10	13	8
4	10	14	4
5	45	15	6
6	19	16	15
7	10	17	18
8	12	18	5
9	6	19	21
10	3	20	11

The Persimmon tree branches were girdled in the same manner as the Honey Locust. A grove of Persimmon trees near New Plymouth, Vinton County, was found in which all of the trees had been attacked. Figure 9 shows the method of the workman. This branch was one of the largest girdled branches found. A great many of the branches were in their natural position on the tree, and from the strength required to break them off I judge that under ordinary circumstances they would remain there a year longer.

On this trip to Vinton County it was observed that the Hickory and the Honey Locust and the Linden were girdled and cut to about the same extent as they were in this community. This would indicate that the beetle is widely distributed in this part of the State.

Eggs: The eggs were imbedded between the bark and wood. The female makes the perforations generally under each successive side-shoot, but this is by no means the rule, for eggs are found imbedded in all parts of the branch. After the egg is deposited, the female closes the hole with a gummy secretion. The eggs are about two millimeters in length, (Fig. 1, e), of a whitish color, and long oval in shape. Those under observation were probably laid in October and hatched about December.

I have examined more than a thousand girdled branches, and in every case a peculiar scarring of the bark both above and below the notch extending about one inch in each direction was observed (Fig. 11 and Fig. 12). These scars were made by the female. After laying her eggs she digs with her powerful mandibles, transverse shallow grooves one-sixteenth to one-tenth of an inch long in the bark. There can be no doubt as to her purpose in doing this. It is a precaution taken to make doubly sure that the girdled branch will die, and do away with any possibility of the bark growing together and healing the wound. Just as far as these grooves extend up and down the stem, the bark dies. It is interesting to note that in addition to girdling the branch two inches of the bark is deadened. *On some specimens these transverse grooves were observed both above and below the egg.* This was especially true of the Hickory. The grooves extended along the probable course which the burrowing larva would take. This was not true for all eggs laid in the same branch. Several instances were noted where these grooves were made above and below the eggs which were laid away from buds and branches. It is done to deaden the bark and prevent growth from crushing the egg. Prof. Herrick mentions this in regard to O. texana, but he does not mention the grooves made both above and below the incision. We conclude that the species differ in this particular.

Larvae: The larvae are white in color and from one-half to three-fourths of an inch long. They vary very much in size. One would judge that those destined to produce females are larger than the others. The larvae found in the deadened Elm branches were smaller than those found in the girdled Honey Locust branches. Probably the difference in the kind of nutriment obtained determines the size of the larvae.

When examined with a lens, the body is found to be sparsely covered with short, dark hairs. These hairs are more numerous on the anterior end than on the posterior end. The mouth parts are brown. After hatching they burrow in the wood and remain there until late in the following summer. Beginning early in the spring they excavate galleries in the dead branch just beneath the bark. Frequently they are found burrowing in the solid wood, and still more frequently in the pith. Their growth is very slow and it takes very little wood to satisfy them.

In one instance a larva came to maturity and changed to a pupa in a gallery two inches long. This gallery was about one-eighth of an inch in diameter. Two pupae were found side by side in separate galleries in a branch one-half inch in diameter. At present I am unable to state definitely how long the larvae exist in these cut-off branches. Some at least spend two winters in the wood, but this can not be said of all. This point is now under observation.

Before the larva changes to a pupa, it cuts a pinhole in the bark near the end of the gallery, and closes the opening of the burrow with fine shavings. This gives the pupal cell an opening to the outside for air and egress when the proper time comes.

In a girdled Hickory branch now before me the larvae average one-fifth inch in length. They are at work in galleries one-fourth inch in length, and none of them have burrowed deep into the wood. These larvae were hatched more than five months ago. This shows plainly how slow their growth is. Owing to the scarcity of full grown larvae we can logically conclude that these small larvae will be our girdlers this coming Fall. Some of the smaller and poorly nourished larvae will certainly pass another winter in the branches. In every instance observed the two-winter larvae were found only in the Honey Locust branches. The extreme hardness of this wood might account for this delayed development.

The number of eggs laid in girdled branches varies from three to twenty. Below is given a record of the number of eggs laid in twenty branches. The count was made at random, and includes branches from different trees.

No. of Branch.	No. of Eggs.	No. of Branch.	No. of Eggs.
1	12	11	11
2	5	12	13
3	8	13	7
4	6	14	4
5	11	15	8
6	9	16	3
7	18	17	16
8	14	18	12
9	5	19	6
10	20	20	17

Pupae: The eggs laid in October, 1907, have not gone into the pupa state yet, May 30, 1908. Those laid in October, 1906, passed into the pupa state sometime between March and May of this year. The pupae are white. They vary in length from five-sixteenths to five-eighths of an inch. They lie in the galleries which were described above.

Adults: About the first of June adults were found nicely hidden away in the galleries. On being removed to the open, they flew away with perfect ease. Further observations are now being made with the hopes that more light may be thrown on the daily activities of the adult form.

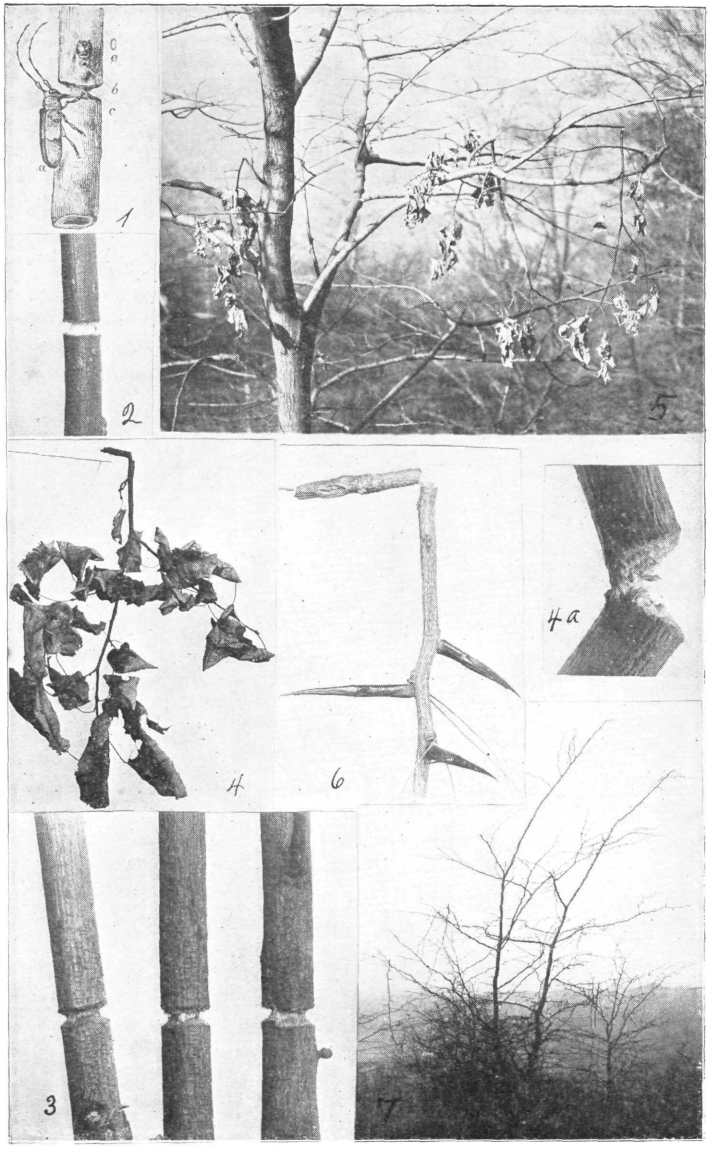
In this work I received many valuable suggestions from Dr. W. F. Copeland and Dr. W. F. Mercer, to both of whom I feel deeply indebted.

LITERATURE.

1. Glenn W. Herrick. Oncideres texana Horn. Mississippi Agricultural Experiment Station Bull. 86.
2. E. E. Faville and P. J. Parrott. Elm Twig-Girdler, Kansas State Agricultural College Bull. 77.
3. A. S. Packard, Jr. Insects Injurious to Forest and Shade Trees. U. S. Entomological Com. Bull. 7.

EXPLANATION OF FIGURES OF PLATES I AND II.

Fig. 1. Oncideres cingulatus. After Riley.
Fig. 2. Elm twig.
Fig. 3. Hickory twigs.
Fig. 4. Showing the manner of cutting off the Linden branches.
Fig. 4a. Large view showing details of cut.
Fig. 5. Three Linden branches hanging ready to drop at the first wind.
Fig. 6. Honey-locust twig.
Fig. 7. A Honey-locust shrub on North Hill, Athens, O. Forty-five branches girdled.
Fig. 8. A Honey-locust shrub on North Hill, Athens, O. Thirteen branches girdled.
Fig. 9. Girdled twig of Persimmon.
Fig. 10. Girdled Persimmon branches. Photographed near New Plymouth, Vinton County, O.
Fig. 11. Girdled Persimmon branch showing transverse scars.
Fig. 12. Girdled Elm branch showing transverse scars.



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